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Greater Forearm Blood Flow is Associated with Better Walking Economy and Gait Speed in Older Adults

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Gait speed decline is a well-established predictor of disability and mortality in older adults. Compromised energetic efficiency (i.e. walking economy) is a strong contributor to gait speed decline, but the underlying mechanisms influencing walking economy are undefined. Impaired vascular function is common with aging and thus may be an important contributor to the development of compromised walking economy and slow gait speed, yet the relationships among blood flow within skeletal muscle, walking economy, and gait speed in older adults are unknown. **PURPOSE:** To examine the relationship between measured forearm blood flow and (i) walking economy and (ii) gait speed in older men and woman. **METHODS:** Resting arterial inflow and reactive hyperemic blood flow (RHBF) of the left forearm was measured in 55 participants of the Longitudinal Aging Study at Towson (LAST; 53% male, mean age 70, range 51-91 years) using venous occlusion plethysmography. Walking economy was measured as the average rate of oxygen consumption during the final 2 minutes of a 5 minute standardized treadmill-based walking test at 1.5 mile per hour. Gait speed was assessed during 2.5 minutes of normal-paced walking over a 20-meter course. The association between RHBF and walking economy and RHBF and gait speed was modeled using linear regression, adjusting for age, height, and fat-free mass. Sobel tests were used to assess possible mediating effects. **RESULTS:** In fully adjusted models, RHBF (mean RHBF: $18.0 \pm 5.9 \text{ mL} \cdot 100\text{mL tissue}^{-1} \cdot \text{min}^{-1}$) was negatively associated with oxygen consumption ($\beta = -7.5$, $p < 0.01$), indicating that walking economy was 7.5 mL/min lower for each one-unit increase in blood flow. Gait speed (mean $1.3 \pm 0.2 \text{ m/s}$) was positively associated with blood flow ($\beta = 0.01$, $p = 0.05$), indicating that gait speed was 0.01 m/s faster for each one-unit increase in blood flow. Mediation analyses further suggested that blood flow may mediate the association between walking economy and gait speed ($p=0.06$). **CONCLUSION:** RHBF is a significant predictor of both walking economy and gait speed in older adults, suggesting that better overall vascular health is related to enhanced walking economy and gait speed. Therefore, interventions aimed at improving vascular health in the aging population may be beneficial in maintaining gait speed and mobility with age.